# Qwest Foundation for Education
# Competitive Sub-grant Application Assurance Sheet

Project Title: **Owyhee Weed Mapping & GIS Project** Amount of Request: $**9,980.00**

District Name: **Homedale School District** Number: **370**

Name of Certificated Teacher (or "lead teacher" if more than one): **Jennifer J. Martin**

Name of School currently teaching at: **Homedale Middle School**

Years taught in Idaho K-12 public education: **1 year**

Content area(s) that you are teaching in Idaho K-12 public education: **Science**

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**I certify that if I receive a Qwest Foundation for Education Grant –**

- **I agree to create a video highlighting my project for the purposes of sharing best practices with other Idaho K-12 teachers.**
- **I agree to do one presentation on my project to other Idaho K-12 teachers before October 31, 2009.**
- **I agree to submit an electronic report to the Idaho State Department of Education before October 31, 2009.**

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|---|---|---|
| **Superintendent Name** (print)<br>Tim Rosandick | E-mail<br>trosandick@homedaleschools.org | Telephone<br>(208) 337-4611 |
| Signature | | |
| **Principal Name** (print)<br>Luci Asumendi-Mereness | E-mail<br>Asumendi@homedaleschools.org | Telephone<br>(208) 337-5780 |
| Signature | | |
| **Teacher or Lead Teacher** (print)<br>Jennifer J. Martin | E-mail<br>jmartin@homedaleschools.org | Telephone<br>(208) 337-5780 |
| Signature | | |

## ABSTRACT

The Owyhee Weed Mapping and GIS Project will primarily focus on noxious weed identification, mapping, and monitoring in the Succor Creek watershed located adjacent to Homedale Middle School. The implementation of this project will engage students in a cooperative effort to address a natural resource concern affecting the local community. As part of this project students will learn to collect data using handheld GPS units. Noxious weed identification and associated lessons in botany will correlate with the project. Students will also learn to employ GIS software for the purpose of managing, analyzing, and mapping collected data. Incorporating GIS technology into the study of local noxious weeds will enable students to collect and present valuable data to county officials and natural resource organizations. This use of GIS software will allow students to synthesize classroom data in a professional format that will make it useable by local professionals and in regional weed databases. This project will afford students an opportunity to work with community experts to help solve an important natural resource concern.

Project implementation will occur through the efforts of a project team. The project team will draw on the expertise of 2 middle school science teachers, the middle school principal, an instructional technology coordinator, a community weed specialist, and a natural resource outreach coordinator. These individuals will work together to accomplish the following goals:

- Introduce and familiarize students with GPS and GIS technology
- Enhance student awareness of noxious weeds and other watershed issues of local importance
- Engage students in data manipulation through project and community-based learning

Students' abilities to produce quality data that can be incorporated into existing weed databases will provide a basis for evaluating the success of the Owyhee Weed Mapping and GIS Project. Expressed increases in student interest in science following project implementation will serve as an additional indicator for success. Community feedback on student presentations and outreach efforts will also factor into evaluating project effectiveness.

Overall, the Owyhee Weed Mapping and GIS Project aims to provide students with a meaningful way of learning about the science that surrounds them. Students will gain knowledge about important technology while helping to find solutions to real-world problems. This experience will push kids to engage not only as students contributing to a classroom, but also as citizens contributing to their community.

## CURRENT INNOVATIVE PRACTICES

The Owyhee Weed Mapping and GIS Project will extend innovative practices already occurring in Homedale science classes. The project will enhance curriculum, improve opportunities for project-based learning, increase hands-on interaction with technology, and showcase science as a subject meaningful and applicable to daily life.

This year, Homedale Middle School expanded its curriculum by offering additional science courses to its students. These courses include Applied Science, Advanced Science, Pre-Engineering, and Physical Science. Such variety of courses aims to motivate students and increase their exposure to the fields of science, technology, and math. Approximately half of the 8$^{th}$ grade will take more than one science class this year. This additional contact will increase student performance in science.

Student-directed learning where students help determine topics in science that they are interested in studying, is another innovative practice at work in my science classes. For instance, at the beginning of the year students in Advanced Science recognized renewable energy and technology as areas of particular interest. This class pursued this interest by signing up to participate in the Future City Competition at Boise State University. The Future City endeavor provides an opportunity for students to work collaboratively in a project-based learning environment while researching new technology related to renewable energy. Here, students are individually and collectively accountable for outcomes tied to subject matter they deem important. Student engagement and accountability increase as a result of student chosen curriculum and project based learning. The Owyhee Weed Mapping and GIS proposal will provide additional student directed and project based learning opportunities for students.

Making the subject relevant to students by exploring local issues in science is another indicator of innovation in my classroom. Classes frequently study tangible aspects of science found in the local environment. This often includes small field trips to the outdoor classroom. Students study topics of local importance such as soil health, agricultural erosion, juniper invasion, game bird populations, etc… Students recognize these topics from local news and from their own dinner table discussions. This recognition enables students to acknowledge the prevalence of science in everyday life. Studying noxious weeds and contributing valuable data to local weed authorities will further the importance of science in the minds of students.

Though often limited by a lack of resources, teaching with technology is an innovative practice incorporated into my science lessons. Earlier this year, I briefly introduced students to handheld GPS units I borrowed for two days as a one-time favor. I've also taught a couple of lessons using a building-shared Airliner. The proposed project will increase student interaction with such applicable technology while gaining important skills in science. Technology incorporation increases student engagement, while simultaneously helping to prepare students for the high-tech world that they will be face upon graduation.

The Owyhee Weed Mapping and GIS Project will more actively involve students in the scientific process. The project will promote the use of innovative technology in developing student-generated noxious weed data that will be important to the local community.

## PROJECT PROPOSAL

**Project Description:**

The Owyhee Weed Mapping and GIS Project will primarily focus on noxious weed identification, mapping, and monitoring in the Succor Creek watershed located adjacent to Homedale Middle School. Students will be trained in the use of handheld GPS units. Students will also sharpen their botany skills as they research specific noxious weed species threatening the local area (e.g. Tamarisk, Perennial pepperweed, etc…). Once students are comfortable using the handheld GPS units and have gathered the appropriate background concerning the biology of specific noxious weeds, they will move into the outdoor classroom to complete a noxious weed survey. Weed data will be collected using the GPS units. Using the Smart board, students will then collectively explore how to upload and manipulate data with Arc View GIS software. Students will practice using the software to make and manipulate maps of the data that they collect. Students will then analyze data to determine where best to establish weed monitoring plots for study by future classes. Students will gather baseline data for these monitoring plots through photo documentation. These photos will also be incorporated into project maps using the Arc View software.

Incorporating GIS technology into the study of local noxious weeds will enable students to collect and present valuable data to county officials and natural resource organizations. They will use the Airliner and Smart Board to create their community presentation. Students will also create noxious weed identification cards / posters as part of an effort to increase noxious weed awareness within the community.

The implementation of this project will engage students in a cooperative effort to address a natural resource concern affecting the local community. This project offers a hands-on and meaningful way for students to participate in the scientific process. It reinforces existing innovative practices of enhanced curriculum, project-based learning, hands-on interaction, and making science applicable to students.

**Project Team Members:**

Lead Instructor & Project Manager – Jennifer Martin, *Homedale Middle School Science Dept.*

- *Background*: Prior to teaching, Jennifer has 9 years experience working in the natural resource field as a watershed specialist and project manager. This work included supervising the Jordan Valley Cooperative Weed Management Area and its projects. Jennifer also holds a Bachelor's of Science in Environmental Science.
- *Tasks*: Jennifer will ensure that all aspects of the project are completed in a timely manner; will develop and implement GPS and GIS curriculum; will organize guest speakers on GIS technology and noxious weeds; will guide students through noxious weed identification and proper scientific data collection; will assist students in establishing weed monitoring plots for future study; will coordinate the transfer of student collected data to local weed officials; will organize opportunities for students to present their findings to the local community; and will fulfill the grant reporting requirements.

Supporting Instructor – Debby Turner, *Homedale Middle School Science Dept.*

- *Background*: Debby Turner has taught in Homedale for 16 years. She is considered a model teacher among her peers and serves as a SIOP instruction coach at the middle

school and high school. She is on the Homedale Middle School Leadership Team and teaches 7th grade Life Science.
- *Tasks*: Debby will provide instructional support, review lesson plans, and assist in curriculum development that will incorporate GIS technology.

Administrative Support – Luci Asumendi-Mereness, *Homedale Middle School Principal*
- *Background*: Luci Asumendi-Mereness has worked as principal of Homedale Middle School for the past 2 years. She has extensive experience working effectively with middle school aged kids as a teacher and as an administrator.
- Tasks: Luci will provide necessary administrative support to the project. She will arrange for occasional transport of students to local field sites to observe and map noxious weed invasions. Luci will also provide supervision to ensure that technology is appropriately incorporated into the science classroom.

Technology Advisor – Phyllis Beck, *Homedale School District Technology Dept.*
- *Background*: Phyllis Beck has experience teaching in the classroom before spending the last several years working as the Instructional Technology Coordinator for Homedale School District. She has extensive experience incorporating technology into instructional lessons.
- *Tasks*: Phyllis will be instrumental in integrating GIS and GPS technology into the science curriculum. She will work with the lead instructor to develop and review lessons using the GPS units and the GIS software. Phyllis will also provide IT support to ensure that all technological equipment is set-up and maintained properly.

Weed Specialist – Eric Morrison, *Jordan Valley Cooperative Weed Management Area*
- *Background*: Eric Morrison has a Master's in Rangeland Ecology and works as the Coordinator for the Jordan Valley Cooperative Weed Management Area. He also has decades of experience working for the University of Idaho as an extension agent in Owyhee County.
- *Tasks*: Eric will provide technical support and will assist the lead teacher in instructing students to use GPS units and GIS software. Eric will also make presentations about specific noxious weeds of current concern in the Succor Creek Watershed. Students will be able to use Eric as an additional expert resource as they gather data in a format that will be useable to the Owyhee Watershed Council, the JV CWMA, and Owyhee County.

Natural Resource Educator – Michaelann Seiders, *Owyhee Watershed Council*
- Background: Michaelann Seiders serves as the Outreach and Education Coordinator for the Owyhee Watershed Council.
- Tasks: Michaelann will assist in organizing community outreach opportunities for students to share their data

**Feasibility:**

The expertise of the project team, the commitment of the school and district administration, and the proximity of suitable sites make the Owyhee Weed Mapping and GIS Project a feasible proposal. The project team will include professionals with extensive experience in all of the necessary fields: natural resource management, secondary education, and technology. The combined efforts of included team members will ensure that resources are adapted to the classroom in a manner that produces credible and usable survey data. The commitment of school and district administration will also ensure project success. The principal and superintendent are

committed to providing the support necessary to implement the project in an efficient and effective manner. Informal surveys of the outdoor classroom indicate that several noxious weed populations exist directly on Homedale Middle School property. This finding reduces the amount of time and money that the project will take to complete.

**Sustainability:**

The creation of noxious weed monitoring plots will increase the sustainability of the project. Continued monitoring of vegetation and treatment effectiveness within these weed plots will allow the perpetuation of this project from year to year. The project will be continuous as students may choose different sites or species to survey and monitor in subsequent years. The project may be adapted to future applications that could focus on other local watershed issues (e.g. water quality, juniper invasion, sage grouse leks, irrigation water use, red band trout populations, etc…).

**School / District Support:**

Homedale School District and Homedale Middle School support the Owyhee Weed Mapping and GIS Project as a means of improving student achievement in science through hands-on project based learning. The District will provide IT support for the installation of the Smart board and associated ceiling mounted projector. The District will also provide IT staff to assist in the installation Arc View GIS Software and equipment maintenance. Homedale Middle School will also support the project by providing assistance in developing GIS curriculum, organizing occasional field trips to noxious weed sites, and arranging community outreach opportunities. Homedale Middle School will also provide a computer in the classroom for use as part of the project.

**Anticipated Outcomes / Impacts:**

The following are some of the anticipated outcomes of the Owyhee Weed Mapping and GIS Project:

- Students will be able to effectively and efficiently use handheld GPS units.
- Students will be able to collect, upload, and manipulate data using GPS units and Arc View GIS software.
- Students will create accurate, computer generated topographical maps of local noxious weed invasions using Arc View GIS software.
- Students will be able to recognize and identify noxious weed species invading the local area. Students will also be able to explain the impacts of these noxious weeds on the local ecosystem.
- Students will create photographic noxious weed identification cards for student use and community distribution.
- Students will complete a noxious weed survey of Homedale Middle School's outdoor classroom.
- Students will use the Smart board to develop a presentation and present their findings to the community and will submit their data to the county weed database.
- Students will develop 3 plots for future classes to use to monitor changes in weed populations over time and changes in weed populations under different treatments.

## PROJECT SCOPE

The Owyhee Weed Mapping and GIS Project will be evaluated on its success in meeting the following goals and objectives:

**1. Goal 1: Introduce and familiarize students with GPS and GIS technology**

A. Objective 1-1: By May 2009, each student enrolled in science will be able to locate a waypoint using a handheld GPS unit.

- Task 1-1 – The instructor will present a minimum of 5 lessons that incorporate GPS and GIS technology (Feb '09 – May '09)

B. Objective 1-2: By May 2009, students will be able to successfully navigate Arc View GIS software.

- Task 1-2 – Each student will create a computerized map using Arc View GIS software (March '09 – May '09)

**2. Goal 2: Enhance student awareness of noxious weeds and other watershed issues of local importance**

A. Objective 2-1: By May 2009, students will be able to identify a minimum of 3 noxious weeds threatening the Succor Creek Watershed.

- Task 2-1 – The instructor will have arranged for a classroom presentation from local weed specialists to discuss specific noxious weeds and how they are impacting the Succor Creek Watershed (Jan '09 – Mar '09).
- Task 2-2 – The instructor will facilitate weed identification through a minimum of 3 site visits to Succor Creek to locate and identify noxious weed species (Feb '09 – May '09).
- Task 2-3 – Students will create photographic noxious weed identification cards including life cycle and location information for a minimum of 3 noxious weed species (March '09 – May '09).

B. Objective 2-2: By May 2009, students will complete a survey of noxious weeds in the outdoor classroom along Succor Creek.

- Task 2-4 – Students will document the presence of noxious weed species in the outdoor classroom along Succor Creek by collecting data using handheld GPS units (Mar '09 – May '09).
- Task 2-5 – Students will work with the instructor and the JV CWMA Coordinator to establish a minimum of 3 monitoring plots along Succor Creek (Mar '09 – May '09).

**3. Goal 3: Engage students in data manipulation through project and community-based learning**

A. Objective 3-1: By May 2009, students will present their data in at least 1 community forum.

- Task 3-1 – Students will upload and manipulate all collected data into charts and maps using the Smart board and GIS software in order to develop a presentation on noxious weeds (Mar '09-May '09).
- Task 3-2 – The instructor will arrange for a student presentation using the Airliner to a local natural resource organization, the City Council, and/or the school board (May '09).

B. Objective 3-2: By May 2009, students will distribute photographic noxious weed identification cards around the community in order to enhance noxious weed awareness.

- Task 3-3 – The instructor will select student-created photographic weed id cards to copy and distribute around the community (May '09- June '09).

## PROJECT BUDGET

In order to implement the Owyhee Weed Mapping and GIS Project, Homedale Middle School will need to acquire the following items totaling $9,980:

- GIS Curriculum Development: ($130.00)
  - **Making Spatial Decisions Using GIS** (*Student Workbook*)
  - **Mapping Our World Using GIS Lessons for Educators** (*Teaching Module*)

- Noxious Weed Identification: ($3,550.00)
  - **A classroom set of handheld ETrex Legend GPS Units** (*units will be used to introduce GPS and GIS technology through hands-on learning activities, for students to locate and mark weed infestations, and to locate previously marked plots for weed monitoring purposes*)
  - **Digital Camera** (*will be used to create photographic noxious weed identification cards for students and to document changes in monitoring plots over time*)

- Manage, Analyze, and Map Weed Data: ($6,300.00)
  - **ESRI Arc View 9.3 GIS Software** (*will enable students to upload and analyze data collected with GPS units; will also allow students to create maps using GPS collected data*)
  - **Smart board 660 64"** (*will allow students to interact collectively using GIS software with instructor feedback and minimizes the license requirements for expensive software*)
  - **Ceiling Projector Mounted & Installed** (*will maximize classroom workspace while students use the Smart board to study noxious weeds and GIS technology)*
  - **Airliner** (*will increase student proximity and involvement in mapping and data analysis activities*)

## Owyhee Weed Mapping Project
## Budget Sheet

| Activity | Materials & Supplies | Capital Objects | Quantity | Price Per Unit | Total |
|---|---|---|---|---|---|
| Develop and Introduce GIS Curriculum | Making Spatial Decisions Using GIS Student Workbook | | 1 | $50.00 | $50.00 |
| | Mapping Our World Using GIS Lessons for Educators (Teaching Module) | | 1 | $80.00 | $80.00 |
| Identify noxious weeds near Succor Creek | | Handheld GPS Units (Garmin Etrex Legend) | 30 | $110.00 | $3,300.00 |
| | | Digital Camera | 1 | $250.00 | $250.00 |
| Manage, analyze, and map weed data | | ESRI ArcView 9.3 Software | 1 | $1,500.00 | $1,500.00 |
| | | Smart Board 660 (64") | 1 | $1,500.00 | $1,500.00 |
| | | Ceiling Mounted Projector Installed (CM55i-Edu) (Mounting $380.00) | 1 | $2,800.00 | $2,800.00 |
| | | AirLiner | 1 | $500.00 | $500.00 |
| | | | | **TOTAL** | **$9,980.00** |